What is claimed is:

1. A distributed fiber optic sensor, comprising:

a test fiber having a first port and a second port;

a light source for producing a beam of light propagating along the test fiber;

a fiber optic beamsplitter having a first port connected to the light source, a second port connected to the first port of the test fiber, and a third and a fourth port;

a plurality of reflectors with distance-depending differential reflectivity positioned along the test fiber and a plurality of loss-inducing members positioned along the test fiber, wherein said each of the reflectors is matched to each loss-inducing members, wherein at least one reflector is placed between each consecutive loss-inducing members;

an optical reflection detector for detecting a light flux, the optical reflection detector connected to the third port of optic beamsplitter, wherein the reflection detector is adapted to sense changes in the overage power of the light reflected from the reflectors;

an optical transmission detector adapted to receive the light flux, connected to the second port of test fiber, said transmission detector being operable to sense changes in the overage power of the light transmitted through the test fiber; and

a storage transmission-reflection analyzer connected to reflection and transmission detectors and adapted to measure time-behavior of the transmission-reflection dependencies of test fiber, said analyzer being operable to identify the locations and values of any number of consecutive loss-inducing disturbances along the test fiber by using a stored locations and values of previous perturbations and the slope of dependence of normalized reflected average power versus the square of normalized transmitted average power for current loss-inducing perturbation.

2. The fiber optic sensor according to claim 1, wherein, said plurality of reflectors comprises a plurality of Rayleigh scattering centers uniformly distributed along test fiber.

3. The fiber optic sensor according to claim 1, wherein said plurality of reflectors has increasing with the distance differential reflectivity that provides equal localization accuracy along the test fiber

4. The fiber optic sensor according to claim 1, wherein said plurality of reflectors has different differential reflectivity at different locations that provides variable localization accuracy along the test fiber

5. The fiber optic sensor according to claim 1, wherein said test fiber comprises single or multimode plastic fiber.

6. The fiber optic sensor according to claim 1, wherein said plurality of reflectors comprises a single chirped or non-chirped, reflective or long-period Bragg grating.

7. The fiber optic sensor according to claim 1, wherein said beamsplitter comprises optical circulator.

8. The fiber optic sensor according to claim 1, wherein transmission-reflection analyzer for the localization of the first disturbance operates under the following algorithm:

$X= T^2(N-k+1)/N$

where X is a power of a reflected light decrease

N is a number of lumped reflectors,

T is a decrease in percent of the transmitted power

K is an integer, which is defined by the position or number of the loss-inducing member
that is disturbed.

9. The fiber optic sensor according to claim 1, wherein said storage transmission-reflection analyzer being operable to identify the location and value of perturbations that affect the test fiber simultaneously by using a stored locations and values of terminated perturbations and time-dependencies of average transmitted and reflected powers for currently acting disturbances.

10. A method for calculating the value and location of a disturbance in a system, the method comprising the steps of:

positioning an optical fiber sensor along the system to be monitored;

wherein the optical fiber sensor comprises:

a test fiber having a first port and a second port;

a light source for producing a beam of light propagating along the test fiber;

a fiber optic beamsplitter having a first port connected to the light source, a second port connected to the first port of the test fiber, and a third and a fourth port;

a plurality of reflectors positioned along the test fiber and a plurality of loss-inducing members positioned along the test fiber, wherein each of the reflectors is matched to each of the loss-inducing members, wherein at least one reflector is placed between each consecutive loss-inducing members;

an optical reflection detector for detecting a light flux, the optical reflection detector connected to the third port of optic beamsplitter, wherein the reflection detector is adapted to sense changes in the power of the light reflected from the reflectors;

an optical transmission detector adapted to receive the light flux, connected to the second port of test fiber, said transmission detector being operable to sense changes in the power of the light transmitted through the test fiber; and

a transmission-reflection analyzer connected to reflection and transmission detectors, said analyzer adapted to measure and store transmission-reflection dependencies of test fiber, said analyzer being operable to identify the locations and values of any number of consecutive loss-inducing disturbances along the test fiber by using a stored locations and values of previous perturbations and the slope of dependence of normalized reflected average power versus the square of normalized transmitted average power for current loss-inducing perturbation.

measuring and storing transmission-reflection dependencies of test fiber; and

identifying the locations and values of any number of consecutive loss-inducing disturbances along the test fiber by using a stored locations and values of previous perturbations and the slope of dependence of normalized reflected average power versus the square of normalized transmitted average power for current loss-inducing perturbation.